

April 9, 1981

NOAA DIVING SAFETY BULLETIN #81-2

MEMORANDUM FOR: ALL NOAA DIVERS

FROM: J. Morgan Wells  
NOAA Diving Coordinator

SUBJECT: 1. Use of Adapters  
2. First Stage Regulator "Freeze-Up"  
3. Harness/Straps and Inflation  
Devices on Dry Suits  
4. Teflon Washers in Hose Adapters  
5. Dry Suit Neck Seals, Suit Flooding,  
and Buoyancy Loss

1. Use of Adapters, "T's", or Other Multiple-Outlet Swivels, etc., In Intermediate Pressure Portions of Underwater Breathing Apparatus.  
Caution must be used when adding adapters, "T's", or other multiple-outlet swivels to the intermediate pressure portion of UBA which supplies breathing gas to the divers; such as adapters can reduce the gas available during diver inhalation. Such reduction in gas flow may not be apparent at the surface, but can become significant at depth. Recent NOAA Diving Office test indicate that the reduction in gas flow is caused by small diameter of the orifice in adapters which are used to mate UBA components of U.S. and European manufacture, and adapters to add suit-inflation hoses to the intermediate pressure hoses of UBA.

All diving apparatus which includes the components mentioned above should be examined to insure that the inside diameters of adapters and T's through which breathing gas flows are at least as large as the original diameters of the standard fittings on the apparatus. Fittings with inappropriate sealing

surfaces may have matching threads. The use of U.S.-Metric adapters intended for the use of Unisuit inflator hoses on U.S. regulators must not be used to adapt AGA intermediate pressure hoses to U.S. regulators. The threads match, and the use of a Teflon washer (instead of the recessed "O" ring, which cannot be used due to orientation of sealing surface) may provide a seal, but flow is drastically reduced and blowout may occur.

2. First Stage Regulator "Freeze-Up"

During recent NOAA Diving Office tests at 42 degrees F, a "freeze-up" occurred with an AGA Divator UBA. This incident occurred immediately after the diver disconnected the surface supplied air and began using air from a self-contained high pressure source. We believe that this problem was caused by a small quantity of fresh water which entered from the UBA first stage from the umbilical and froze up due to the cooling which accompanied the expansion of the high pressure air. "Freeze-up" caused by water inside UBA can occur at relatively high temperatures. Great care should be exercised to prevent water from entering the gas supply side of UBA.

3. Harness/Straps and Inflation Devices on Dry Suits

NOAA Diving Safety Bulletin #79-1 stated that "where power inflation and exhaust valves/controls for these suits (dry) are located upon the chest, the use of an additional front-mounted buoyancy compensator is an unsafe practice."

Part of the rationale for this statement was based on the accidental, uncontrolled inflation of a dry suit caused by the inability of a diver to remove his hand from between the B.C. and inflation valve following the addition of air to the suit. An accidental blowup resulted from this action.

During recent NOAA Diving Office tests, and unintentional/uncontrolled inflation of a Viking Suit was caused by a diver harness crossing over the inflation valve.

Diving harnesses and other straps must be positioned such that unintentional inflation or deflation of dry suits is not possible.

4. Teflon Washers in Hose Adapters

Teflon washers are commonly found in adapters which convert metric (European) to U.S. manufactured parts in UBA and suit inflators. Overtightening of such fittings can result in excessive flattening of the teflon washers and reduction in the effective diameter of the gas flow path to the point of significant breathing resistance or slow suit inflation. Reduced gas flow may not be apparent at the surface but can be significant at depth or during strenuous activity.

5. DrySuit Neck Seals, Suit Flooding, and Buoyancy Loss

NOAA Diving Safety Bulletin #79-1 contained a revision in the Safety Rule #14c of the Diving Regulations related to the use of buoyancy compensators with dry suits. The following statement was included, "Variable-volume suits (such as Unisuits and Viking suits) provide a diver with adequate flotation and a means of fine buoyancy control."

This statement requires some qualification. If neck seals (dams) are defective, installed in such a fashion that gas can easily pass into the hood, too large, or absent, gas can be easily lost from the hood, resulting in significant loss of buoyancy.

Safety Bulletin #79-1 also states, "The Safety Board has determined that, where power inflation and exhaust valves/controls for these suits are located upon the chest, the use of an additional front-mounted buoyancy compensator is an unsafe practice."

Both of the above statements remain correct. What must be emphasized is that any neck seals (dams) which readily allow gas to move from the suit into the hood constitutes a safety hazard, because the suit will not provide the SCUBA diver with adequate flotation.

This means that if a good neck seal can be reasonably assured, no additional buoyancy compensation device is required. If, however, the neck seal cannot be reasonably assured, an additional buoyancy compensating device must be used but the BC must NOT

interfere with access to nor operation of the gas valves on the suit.

Great care must be exercised during training programs where, rather than custom fitted suits, inexperienced divers share suits.